

IN THE SPECIFICATION:

Please amend the specification as follows:

Please substitute the paragraph beginning at page 2, line 23, and ending on page 3, line 4, with the following.

-- The wound state of the round wire coil 116a is shown in Fig. 21, which is an enlarged view of a portion H shown in Fig. 19B. The coil 116 is obtained by winding the round wire coil 116a around a hollow coil into a sectional shape as shown in Fig. 21. As shown in Fig. 22, which is an enlarged view of a portion I, the round wire coil 116a is continuously wound in alignment to form the coil 116, and the coil 116 constitutes the X linear motor 109. --

Please substitute the paragraph beginning at page 3, line 19, and ending on page 4, line 1, with the following.

-- The present invention has been proposed to solve the conventional problems, and has as its object to decrease a gap in a conventional round wire coil to increase the space factor of a copper wire with respect to the coil section, thereby increasing the current density of a driving current supplied to the coil, increasing the linear motor efficiency by a stationary coil and a movable magnet for a constant volume, and ultimately, realizing higher speed and lower power consumption of a stage apparatus. --

Please substitute the paragraph beginning at page 4, line 2, with the following.

-- According to the present invention, the foregoing object is attained by providing an exposure apparatus for exposing a substrate to a pattern drawn on a master surface, comprising a driving unit for moving master and substrate stages or a linear motor for generating a control power for cutting off transmission of a reaction force and/or an external vibration to the exposure apparatus in driving the stages, wherein the linear motor has a coil formed by winding a foil-like conductor having an insulating layer in a multilayered structure. --

Please substitute the paragraph beginning at page 4, line 21, and ending on page 5, line 5, with the following.

-- According to the present invention, the foregoing object is attained by providing an exposure apparatus for exposing a substrate to a pattern drawn on a master surface, comprising a driving unit for moving master and substrate stages or a linear motor for generating a control power for cutting off transmission of a reaction force and/or an external vibration to the exposure apparatus in driving the stages, wherein the linear motor has a coil formed by winding a foil-like conductor in a multilayered structure via an insulating layer, and a lead line for connecting an inner or outer end of the coil to an external electrode. --

Please substitute the paragraph beginning at page 5, line 22, and ending on page 6, line 6, with the following.

-- According to the present invention, the foregoing object is attained by providing an exposure apparatus for exposing a substrate to a pattern drawn on a master surface, comprising a

driving unit for moving master and substrate stages or a linear motor for generating a control power for cutting off transmission of a reaction force and/or an external vibration to the exposure apparatus in driving stages, wherein the linear motor has a coil formed by winding a foil-like conductor in a multilayered structure via an insulating layer, and a relay substrate for connecting an inner or outer end of the coil to an external electrode. --

Please substitute the paragraph beginning at page 6, line 7, with the following.

-- The relay substrate is disposed at a predetermined portion in the inner or outer circumferential surface direction of the coil or in the side surface direction in contact with the edges of inner and outer circumferential surfaces. The relay substrate is connected to a connection terminal between the relay substrate and an external electrode and a lead line extending from an inner or outer end, and relays them. The relay substrate is, e.g., a substrate bearing another conductor wire or conductor pattern, or a flexible substrate. The use of the relay substrate can prevent disconnection or a short circuit caused by the tangle of a lead line, a cooling solution, or the like, and can implement a compact, a simple, linear motor even when many lead lines are laid out inside a linear motor constituted by aligning a plurality of coils. Accordingly, the linear motor can be easily manufactured, attached, and maintained in an exposure apparatus limited in the installation space for members. Cost reduction can also be expected in the manufacture and operation of the apparatus. --

Please substitute the paragraph beginning at page 7, line 1, with the following.

-- According to the present invention, the foregoing object is attained by providing an exposure apparatus for exposing a substrate to a pattern drawn on a master surface, comprising a driving unit for moving master and substrate stages or a linear motor for generating a control power for cutting off transmission of a reaction force and/or an external vibration to the exposure apparatus in driving the stages, wherein the linear motor has a seamlessly continuous coil formed from a plurality of partial coils prepared by winding a foil-like conductor in a multilayered structure via an insulating layer so as to make current application/rotation directions coincide with each other. --

Please substitute the paragraph beginning at page 7, line 15, and ending on page 8, line 4, with the following.

-- In general, this coil is constituted by spacing apart or stacking a plurality of partial coils in the gap direction of a magnetic circuit. This enables ~~flowing~~ a coolant to flow through a gap between the partial coils and cooling the coil from the center. ~~Flowing~~ Causing a coolant to flow through the center requires two partial coils. A foil-like conductor between the two different partial coils is bent spirally (α winding) or bent at ~~the~~ a right angle twice in the same rotational direction (shift winding), thereby continuously forming the coil. In this case, the coil is preferably constituted such that the foil-like conductor is wound spirally or by bending it a plurality of number of times between the two partial coils. By continuously forming the inner

circumferential surface, any lead line need not be extracted from the inner circumferential surface, and the coil can be simplified. --

Please substitute the paragraph beginning at page 8, line 5, with the following.

-- According to the present invention, the foregoing object is attained by providing an exposure apparatus for exposing a substrate to a pattern drawn on a master surface, comprising a driving unit for moving master and substrate stages or a linear motor for generating a control power for cutting off transmission of a reaction force and/or an external vibration to the exposure apparatus in driving the stages, wherein the linear motor has a coil, which is formed by winding a foil-like conductor in a multilayered structure via an insulating layer and has a through hole. --

Please substitute the paragraph beginning at page 8, line 16, with the following.

-- The through hole is formed to supply a coolant into the multilayered portion of the coil. The through hole generally extends from the inner circumferential surface to the outer circumferential surface at an intermediate or arbitrary position on the foil-like conductor of the coil in the direction of the width. By forming a hole extending through the coil, the coolant can flow through the through hole to efficiently cool the coil. A linear motor can be easily designed, which obtains an optimal cooling efficiency while maximally maintaining the space factor of the conductor. The wall surface of the through hole is desirably insulated. --

Please substitute the paragraph beginning at page 9, line 1, with the following.

-- According to the present invention, the foregoing object is attained by providing a semiconductor manufacturing method comprising the steps of installing a plurality of semiconductor manufacturing apparatuses, including an exposure apparatus, in a semiconductor manufacturing factory, and manufacturing a semiconductor device by using the plurality of semiconductor manufacturing apparatuses, wherein the exposure apparatus includes a driving unit for moving master and substrate stages or a linear motor for generating a control power for cutting off transmission of a reaction force and/or an external vibration to the exposure apparatus in driving the stages, and the linear motor has a coil formed by winding a foil-like conductor having an insulating layer in a multilayered structure. --

Please substitute the paragraph beginning at page 10, line 9, with the following.

-- According to the present invention, the foregoing object is attained by providing a maintenance method for an exposure apparatus, comprising the steps of preparing a database for accumulating information about maintenance of the exposure apparatus on an external network outside a factory in which the exposure apparatus is installed, connecting the exposure apparatus to a local area network in the factory, and maintaining the exposure apparatus on the basis of information accumulated in the database by using the external network and the local area network, wherein the exposure apparatus includes a driving unit for moving master and substrate stages or a linear motor for generating a control power for cutting off transmission of a reaction force and/or an external vibration to the exposure apparatus in driving the stages, and the linear

motor has a coil formed by winding a foil-like conductor having an insulating layer in a multilayered structure. --

Please substitute the paragraph beginning at page 17, line 3, with the following.

-- Particularly, when the linear motor is mounted as a driving means for the stage apparatus, the linear motor generally comprises a plurality of coils aligned so as to make the outer circumferential surfaces of adjacent coils face each other. In this linear coil, the stationary members comprise coils, and the movable members comprise magnets. --

Please substitute the paragraph beginning at page 18, line 7, with the following.

-- The foil-like conductor can be a copper foil, an aluminum foil, a copper-aluminum alloy foil, a silver foil, or a gold foil. The foil-like conductor may use a single metal foil, but may use a cladding member with a multilayered structure made up of conductors of different materials (e.g., a multilayered structure of different metals.) The cladding member is formed from a conductive material and a high-permeability material. Forming the foil-like conductor from the cladding member can reduce the coil weight, increase the gap magnetic flux density by the high-permeability material, and improve the frequency response characteristic of the coil. --

Please substitute the paragraph beginning at page 18, line 25, and ending on page 19, line 7, with the following.

-- To prevent a rare short circuit on the side surface and corner of the coil main body, the foil-like conductor is oxidized on the side end or corner of the coil in the direction of the width. A short circuit can be prevented between conductor layers by setting the width of the insulating layer slightly larger than that of the foil-like conductor to secure insulation between adjacent conductor layers at the end of the conductor foil when the foil-like conductor having the insulating layer is wound in a multilayered structure. --

Please substitute the paragraph beginning at page 21, line 3, with the following.

-- In Figs. 3A and 3B, a plurality of coils 16 are aligned within an effective stroke in the driving direction of the X linear motor 9. The lead line of each coil 16 is connected to a relay substrate 17 bearing an extraction pattern for extracting the electrode of the coil 16 to the outside of the linear motor. Further, the lead line of the coil 16 is connected via the relay substrate 17 to a connector 18 for connecting the lead line to an external electrode. The fine moving stage 7 incorporates movable magnets 19 magnetized as shown in Fig. 3B with respect to the linear motor stationary members. By flowing a driving current through the coils 16, the movable magnets ~~119~~ 19 are moved by a Lorentz force in a moving direction ($\pm X$ direction) indicated by the arrow, thereby driving the fine moving stage 7. --

Please substitute the paragraph beginning at page 21, line 20, with the following.

-- In Fig. 4, the foil coil 16a has a copper foil 16b serving as a foil-like conductor with a foil-like section and a thickness of about several micrometers (μm) to several ~~ten~~ tens of

micrometers (μm), and an insulating base film 16c serving as an insulating layer with a thickness of several micrometers (μm). The copper foil 16b is deposited on or adhered to one surface of the insulating base film 16c. --

Please substitute the paragraph beginning at page 23, line 14, with the following.

-- Fig. 14 is a view showing a whole exposure apparatus according to the second embodiment. In Fig. 14, reference numeral 1 denotes an illumination system unit having an exposure light source and a function of shaping exposure light and irradiating a reticle; 2, a reticle stage, which supports a reticle and scans the reticle with respect to a wafer at a predetermined exposure reduction ratio to the wafer; 3, a reduction projection lens of a projection optical system for reducing and projecting a master pattern onto a wafer; 4, a wafer stage for sequentially moving a wafer every exposure; and 5, an exposure apparatus main body, which supports the reticle stage 2, projection lens 3, and wafer stage 4. --

Please substitute the paragraph beginning at page 27, line 2, with the following.

-- It is also possible, as shown in Fig. 7B, to extract the foil coil of the coil 16 from the main body of the coil 16, to connect the foil coil to the lead line 16f via solder 16e at the middle of the foil coil, and to connect the lead line 16f to a linear motor terminal or connector. --

Please substitute the paragraph beginning at page 27, line 8, with the following.

-- It is also possible, as shown in Fig. 7D, to solder (16e) the lead line 16f at a winding start and end (inner and outer ends) on the inner and outer circumferential surfaces of the coil 16, to extract the lead line from the coil main body, and to connect the lead line to a linear motor terminal or connector. --

Please substitute the paragraph beginning at page 28, line 26, and ending on page 29, line 11, with the following.

-- The fifth embodiment of the present invention will be described with reference to Figs. 11A, 11B, 12A and 12B. As shown in Fig. 11B₁ which is an enlarged view of a portion E in Fig. 11A, the side end of a copper foil 16b is oxidized to form an oxide film 16m. The oxide film 16m provides electrical insulating properties, which can prevent a rare short circuit between the ends of adjacent foil coil layers. Insulating films 16g are wound on the inner and outer circumferential surfaces of a coil 16, and the outer circumferential surface is entirely coated with an insulating coat 16j, thus compensating for electrical insulation at all the exposed portions of the coil 16. --

Please substitute the paragraph beginning at page 29, line 12, with the following.

-- As shown in Fig. 12A and Fig. 12B₁ which is an enlarged view of a portion F shown in Fig. 12A, oxidization processing at the end of the copper foil 16b, and insulating films 16g and 16k can also be combined. --

Please substitute the paragraph beginning at page 31, line 10, with the following.

-- Figs. 23A and 23B show the state wherein the foil coil according to the eighth embodiment is wound. A coil 16 is constituted such that a band-like foil coil 16a prepared by adhering a copper foil 16b to an insulating base film 16c is wound in a multilayered structure around a hollow coil into a sectional shape shown in Fig. 23A. As shown in Fig. 23B, which is an enlarged view of a portion J shown in Fig. 23A, the foil coil 16a is continuously wound in a multilayered aligned state, and the insulating base film 16c is slightly wider than the copper foil 16b. Thus, the coil 16 is formed with projections at the end of the insulating base film 16c, as shown in Fig. 23B. This coil 16 constitutes the stationary coil of an X linear motor 9. --

Please substitute the paragraph beginning at page 32, line 8, with the following.

-- The method shown in Fig. 24B is a sputtering process in which the copper foil 16b and insulating base film 16c are adhered to each other. According to this method, plasma discharge generated by an ~~electric~~ electrical or magnetic field is applied to a target material (copper) 29a in vacuum. Gas ions are accelerated by the ~~electric~~ electrical field to attack the target material (copper) 29a. By this collision energy, sputtered copper atoms 29b of the target material (copper) 29a move to the surface of the insulating base film 16c. Copper atoms are stacked by sputtering to form the copper foil 16b. At this time, a mask 29c is set at a position where it shields the copper atoms 29b so as to attain a slightly smaller width than that of the insulating base film 16c. As a result, the width of the copper foil 16b is made smaller. After that, the foil coil 16a is wound in a multilayered structure to form the coil 16. --

Please substitute the paragraph beginning at page 32, line 26, and ending on page 33, line 11, with the following.

-- The method shown in Fig. 24C is a grinding process after the copper foil 16b and insulating base film are adhered to each other. A grindstone 29d as shown in Fig. 24C is moved in press contact with the copper foil 16b, grinding the copper foil 16b. The width of the copper foil 16b finally becomes smaller than that of the insulating base film 16c, as shown in Fig. 24C. The unnecessary portion of the copper foil 16b is removed, or the copper foil 16b is cut at the center of a projection at the end of the insulating base film 16c, thereby forming the foil coil 16a. The foil coil 16a is wound in a multilayered structure to form the coil 16. --

Please substitute the paragraph beginning at page 33, line 27, and ending on page 34, line 9, with the following.

-- In this case, a rare short circuit can be prevented between adjacent edges of adjacent layers of the copper foil 16b by bending projections at the end of the insulating base film 16c, as shown in Fig. 25B_a which is an enlarged view of a portion K in Fig. 25A. Insulating films 16g are wound on the inner and outer circumferential surfaces of the coil 16, and the entire outer circumferential surface is coated with an insulating coat 16j. This compensates for electrical insulation at all the exposed portions of the coil 16. --

Please substitute the paragraph beginning at page 34, line 10, with the following.

-- Further, a rare short circuit can be prevented between adjacent edges of adjacent layers of the copper foil 16b by bending projections at the end of the insulating base film 16c, as shown in Fig. 26B₁ which is an enlarged view of a portion L shown in Fig. 26A. Insulating films 16g and 16k are adhered to the inner and outer circumferential surfaces of the coil 16 and the upper and lower surfaces (side surfaces) thereof. This compensates for electrical insulation at all the exposed portions of the coil 16. --

Please substitute the paragraph beginning at page 35, line 5, with the following.

-- As shown in Figs. 28A and 28B, the conductor material may be a cladding foil material 30d prepared by adhering different types of conductors. In this embodiment, the cladding foil material 30d is made up of an aluminum foil 30f and a copper foil 30e. This structure can implement a lightweight coil 16 without increasing the resistance. --

Please substitute the paragraph beginning at page 36, line 19, with the following.

-- (Embodiment of A Semiconductor Production System) --

Please substitute the paragraph beginning at page 36, line 20, and ending on page 37, line 1, with the following.

-- A production system for producing a semiconductor device (e.g., a semiconductor chip such as an IC or LSI, a liquid crystal panel, a CCD, a thin-film magnetic head, a micromachine, or the like) will be exemplified. A trouble remedy or periodic maintenance of a manufacturing

apparatus installed in a semiconductor manufacturing factory, or maintenance service such as software distribution is performed by using a computer network outside the manufacturing factory. --

Please substitute the paragraph beginning at page 37, line 2, with the following.

-- Fig. 31 shows the overall system cut out at a given angle. In Fig. 31, reference numeral 41 denotes a business office of a vendor (e.g., an apparatus supply manufacturer), which provides a semiconductor device manufacturing apparatus. Examples of the manufacturing apparatus are semiconductor manufacturing apparatuses for performing various processes used in a semiconductor manufacturing factory, such as pre-process apparatuses (e.g., a lithography apparatus including an exposure apparatus, a resist processing apparatus, and an etching apparatus, an annealing apparatus, a film formation apparatus, a planarization apparatus, and the like) and post-process apparatuses (e.g., an assembly apparatus, inspection apparatus, and the like). The business office 41 comprises a host management system 48 for providing a maintenance database for the manufacturing apparatus, a plurality of operation terminal computers 50, and a LAN (Local Area Network) 49, which connects the host management system 48 and computers 50 to build an intranet. The host management system 48 has a gateway for connecting the LAN 49 to Internet 45 as an external network of the business office, and a security function for limiting external ~~accesses~~ access. --

Please substitute the paragraph beginning at page 37, line 25, and ending on page 39, line 9, with the following.

-- Reference numerals 42 to 44 denote manufacturing factories of the semiconductor manufacturer or users of manufacturing apparatuses. The manufacturing factories 42 to 44 may belong to different manufacturers or the same manufacturer (e.g., a pre-process factory, a post-process factory, and the like). Each of the factories 42 to 44 is equipped with a plurality of manufacturing apparatuses 46, a LAN (Local Area Network) 51, which connects these apparatuses 46 to construct an intranet, and a host management system 47 serving as a monitoring apparatus for monitoring the operation status of each manufacturing apparatus 46. The host management system 47 in each of the factories 42 to 44 has a gateway for connecting the LAN 51 in the factory to the Internet 45 as an external network of the factory. Each factory can access the host management system 48 of the vendor 41 from the LAN 51 via the Internet 45. The security function of the host management system 48 authorizes access of only a limited user. More specifically, the factory notifies the vendor via the Internet 45 of status information (e.g., the symptom of a manufacturing apparatus in trouble) representing the operation status of each manufacturing apparatus 46, and receives response information (e.g., information designating a remedy against the trouble, or remedy software or data) corresponding to the notification, or maintenance information such as the latest software or help information. Data communication between the factories 42 to 44 and the vendor 41 and data communication via the LAN 51 in each factory adopt a communication protocol (TCP/IP) generally used in the Internet. Instead of using the Internet as an external network of the factory, a dedicated network (e.g., an ISDN)

having high security, which inhibits access of a third party, can be adopted. Also, the user may construct a database in addition to the one provided by the vendor and set the database on an external network, and the host management system may authorize access to the database from a plurality of user factories. --

Please substitute the paragraph beginning at page 39, line 10, and ending on page 41, line 3, with the following.

-- Fig. 32 is a view showing the concept of the overall system of this embodiment that is cut out at a different angle from that shown in Fig. 31. In the above example, a plurality of user factories having manufacturing apparatuses and the management system of the manufacturing apparatus vendor are connected via an external network, and production management of each factory or information of at least one manufacturing apparatus is communicated via the external network. In the example of Fig. 32, a factory having manufacturing apparatuses of a plurality of vendors and the management systems of the vendors for these manufacturing apparatuses are connected via the external network of the factory, and maintenance information of each manufacturing apparatus is communicated. In Fig. 32, reference numeral 201 denotes a manufacturing factory of a manufacturing apparatus user (e.g., a semiconductor device manufacturer) where manufacturing apparatuses for performing various processes, e.g., an exposure apparatus 202, a resist processing apparatus 203, and a film formation apparatus 204 are installed in the manufacturing line of the factory. Fig. 32 shows only one manufacturing factory 201, but a plurality of factories are networked in practice. The respective apparatuses in

the factory are connected to a LAN 206 to build an intranet, and a host management system 205 manages the operation of the manufacturing line. The business offices of vendors (e.g., apparatus supply manufacturers), such as an exposure apparatus manufacturer 210, a resist processing apparatus manufacturer 220, and a film formation apparatus manufacturer 230 comprise host management systems 211, 221, and 231 for executing remote maintenance for the supplied apparatuses. Each host management system has a maintenance database and a gateway for an external network, as described above. The host management system 205 for managing the apparatuses in the manufacturing factory of the user, and the management systems 211, 221, and 231 of the vendors for the respective apparatuses are connected via the Internet or dedicated network serving as an external network 200. If a trouble occurs in any one of a series of manufacturing apparatuses along the manufacturing line in this system, the operation of the manufacturing line stops. This trouble can be quickly solved by remote maintenance from the vendor of the apparatus in trouble via the Internet 200. This can minimize the ~~stop~~ stoppage of the manufacturing line. --

Please substitute the paragraph beginning at page 41, line 4, and ending on page 42, line 4, with the following.

-- Each manufacturing apparatus in the semiconductor manufacturing factory comprises a display, a network interface, and a computer for executing network access software and apparatus operating software, which are stored in a storage device. The storage device is a built-in

memory, hard disk, or network file server. The network access software includes a dedicated or general-purpose web browser, and provides a user interface having a window as shown in Fig. 33 on the display. While referring to this window, the operator who manages manufacturing apparatuses in each factory inputs, in input items on the windows, pieces of information such as the type of manufacturing apparatus (401), serial number (402), subject of trouble (403), occurrence date (404), degree of urgency (405), symptom (406), remedy (407), and progress (408). The pieces of input information are transmitted to the maintenance database via the Internet, and appropriate maintenance information is sent back from the maintenance database and displayed on the display. The user interface provided by the web browser realizes hyperlink functions (410 to 412), as shown in Fig. 33. This allows the operator to access detailed information of each item, receive the latest-version software to be used for a manufacturing apparatus from a software library provided by a vendor, and receive an operation guide (help information) as a reference for the operator in the factory. --

Please substitute the paragraph beginning at page 42, line 5, and ending on page 43, line 4, with the following.

-- A semiconductor device manufacturing process using the above-described production system will be explained. Fig. 17 shows the flow of the whole manufacturing process of the semiconductor device. In step 1 (circuit design), a semiconductor device circuit is designed. In step 2 (mask formation), a mask having the designed circuit pattern is formed. In step 3 (wafer formation), a wafer is formed by using a material such as silicon. In step 4 (wafer process),

called a pre-process, an actual circuit is formed on the wafer by lithography using the prepared mask and wafer. Step 5 (assembly), called a post-process, is the step of forming a semiconductor chip by using the wafer formed in step 4, and includes an assembly process (dicing and bonding) and a packaging process (chip encapsulation). In step 6 (inspection), inspections such as the operation confirmation test and durability test of the semiconductor device manufactured in step 5 are conducted. After these steps, the semiconductor device is completed and shipped (step 7). The pre-process and post-process are performed in separate dedicated factories, and each of the factories receives maintenance by the above-described remote maintenance system. Information for production management and apparatus maintenance is communicated between the pre-process factory and the post-process factory via the Internet or dedicated network. --

Please substitute the paragraph beginning at page 43, line 5, with the following.

-- Fig. 18 shows the detailed flow of the wafer process. In step 11 (oxidation), the wafer surface is oxidized. In step 12 (CVD) an insulating film is formed on the wafer surface. In step 13 (electrode formation), an electrode is formed on the wafer by vapor deposition. In step 14 (ion implantation), ions are implanted in the wafer. In step 15 (resist processing), a photosensitive agent is applied to the wafer. In step 16 (exposure), the above-mentioned exposure apparatus exposes the wafer to the circuit pattern of a mask. In step 17 (developing), the exposed wafer is developed. In step 18 (etching), the resist is etched except for the developed resist image. In step 19 (resist removal), an unnecessary resist after etching is removed. These steps are repeated to form multiple circuit patterns on the wafer. A manufacturing apparatus

used in each step undergoes maintenance by the remote maintenance system, which prevents a trouble in advance. Even if a trouble occurs, the manufacturing apparatus can be quickly recovered. The productivity of the semiconductor device can be increased in comparison with the prior art. --

Please substitute the paragraph beginning at page 46, line 24, and ending on page 47, line 7, with the following.

-- The same effects can be attained by a seamlessly continuous coil made up of a plurality of partial coils prepared by winding a foil-like conductor in a multilayered structure via an insulating layer so as to make their current rotational directions coincide with each other, or a coil obtained by winding a foil-like conductor in a multilayered structure via an insulating layer and forming ~~an~~ a through hole. A coolant can flow to cool the coil, which increases the cooling efficiency of the linear motor and improves the thermal stability of the exposure apparatus. --